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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/006,633	12/05/2001	Keun Kyu Kong	30205/37675	1852

4743 7590 11/05/2003

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EXAMINER

WALKE, AMANDA C

ART UNIT	PAPER NUMBER
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1752

DATE MAILED: 11/05/2003

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/006,633

Applicant(s)

KONG ET AL.

Examiner

Amanda C Walke

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 05 December 2001.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-18 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-8 and 10-18 is/are rejected.
- 7) ☒ Claim(s) 9 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 1-6, 10, 11, 13, and 15-18 are rejected under 35 U.S.C. 102(a) as being anticipated by Kim et al (JP 2001-188341 in view of its English language machine translation).

Kim et al disclose a photoresist composition for resist flow which comprises a thermal curing agent, a resin, a solvent, and a photoacid generator suitable for use in a process for manufacturing a semiconductor device. The thermal curing agent may be chosen from the reference compounds 1-4 which are identical to those instantly claimed ([0015]-[0021]). The compound is added in an amount of 0.1-50, preferably 0.1-5% by weight of the photoresist resin ([0030]). The composition may also comprise a photoacid generator compound such as a diphenyl iodide-salt hexafluorophosphate, diphenyl iodide-salt hexafluoroantimonate, triphenylsulfonium diphenyl hexafluorophosphate, and triphenylsulfonium diphenyl hexafluoroarsenate (as required by the instant claim 11; [0032]). Additionally, the composition comprises an organic solvent such as propylene glycol methyl ether acetate, methyl 3-methoxy propionate, ethyl 3-ethoxypropionate, ethyl lactate, or cyclohexanone, all claimed by the instant claim 13.

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The resist is employed in a method of making a semiconductor device which includes the steps of coating the resist composition onto a substrate, pre-baking the resist, exposing the resist using a KrF laser, post-baking the layer, developing the layer, then heat treating it at a temperature of 110-200 ° C, and the reference teaches that an elevated temperature process wherein the temperature is 150 ° C or more is specifically contemplated ([0039]-[0044]).

Therefore, the reference anticipates the instant claims 1-6, 10, 11, 13, and 15-18.

3. Claims 1-6, 10, 11, 13, and 15-18 are rejected under 35 U.S.C. 102(e) as being anticipated by Kim et al (6,627,384).

The applied reference has a common inventor and assignee with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 102(e) might be overcome either by a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not the invention "by another," or by an appropriate showing under 37 CFR 1.131.

Kim et al disclose a photoresist composition for resist flow which comprises a thermal curing agent, a resin, a solvent, and a photoacid generator suitable for use in a process for manufacturing a semiconductor device. The thermal curing agent may be chosen from the reference compounds 1-4 which are identical to those instantly claimed (column 2, lines 11-17, column 2, line 60-column 3, line 30). The compound is added in an amount of 0.1-50, preferably 0.1-5% by weight of the photoresist resin (column 4, lines 7-14). The composition may also comprise a photoacid generator compound such as a diphenyl iodide-salt hexafluorophosphate, diphenyl iodide-salt hexafluoroantimonate, triphenylsulfonium diphenyl hexafluorophosphate,

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and triphenylsulfonium diphenyl hexafluoroarsenate (as required by the instant claim 11; column 4, lines 17-34). Additionally, the composition comprises an organic solvent such as propylene glycol methyl ether acetate, methyl 3-methoxy propionate, ethyl 3-ethoxypropionate, ethyl lactate, or cyclohexanone, all claimed by the instant claim 13.

The resist is employed in a method of making a semiconductor device which includes the steps of coating the resist composition onto a substrate, pre-baking the resist, exposing the resist using a KrF laser, post-baking the layer, developing the layer, then heat treating it at a temperature of 110-200 °C, and the reference teaches that an elevated temperature process wherein the temperature is 150 °C or more is specifically contemplated (column 4, line 38-column 5, line 53).

Therefore, the reference anticipates the instant claims 1-6, 10, 11, 13, and 15-18.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 1-6 and 10-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shimada et al (JP 2001-109143 in view of its English language machine translation and a spot translation by a PTO employee).

Shimada et al disclose a curable composition comprising a compound which has groups that separately generates an acid and a crosslinking agent when energy is applied and a compound that contains functional groups which react with the first compound. The composition

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of the reference further comprises an organic solvent in an amount of 1-50 % of the resin composition, which when calculated from the examples, meets the limitations of the instant claim 14. Preferred compounds include diethyleneglycol diethyl ether, ethyl lactate, and cyclohexanone ([0113]; instant claim 13). The reference material further comprises an acid generating compound in an amount of 0.1- 20 % by weight of the resin. Preferred examples include onium salts such as triphenylsulfonium hexafluoroarsenate and diphenyl iodide hexafluorophosphate ([0097] and [0098]). The composition is employed in a method of employing the steps of coating the composition onto a substrate, dried, exposed, heated, then developed (it is noted that the instant claim 1 requires that steps a-d be performed, but does not require them to be performed in that order) (see examples). From the spot translation it appears that the exposure is an infrared exposure using an ArF laser or by an electron beam ([0001]), and that the baking/heating takes place at a temperature of 60-150 ° C ([0093], [0119], and [0120]). The reference composition may be employed in the method of making a semiconductor device wherein the composition is coated onto a silicon dioxide wafer ([0123]).

With respect to the structural limitations of the instant claim 1-6, one such compound which has groups that separately generates and acid and a crosslinking agent when energy is applied, III-4, meets the structural limitations for the thermal acid generator of the instant claims 1-6.

Given that the compound is one of about 50 preferred compounds, and one of 8 compounds of formula III, it would have been obvious to one of ordinary skill in the art to prepare the material of the reference choosing compound III-4 as the compound which has groups that separately generates and acid and a crosslinking agent when energy is applied.

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The compound is added in an amount of 0.1 to 60 % by weight of the resin, which overlaps the range of the instant claim 10, and the range of reference shares a common endpoint with the instantly claimed range ([0040]).

6. Claims 7 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kim et al (2001-188341) in view of Jung et al (6,132,926).

Kim et al has been discussed above. The reference teaches that the resin may employ any known photoresist resin constituents.

Jung et al discloses a ArF photoresist copolymer which provides superior etch resistance, thermal resistance, and adhesiveness (column 2, lines 37-40). The preferred copolymer comprises a bicyclo alkene and a maleic anhydride compound (column 2, lines 63-67). A preferred copolymer comprises maleic anhydride and t-butyl 5-norborene-2-carboxylate or 2-hydroxyethyl 5-norborene-2-carboxylate, which meets the limitations of the instant claims 7 and 8.

Given the teachings of Jung et al, it would have been obvious to one of ordinary skill in the art to prepare the material of Kim et al choosing to employ the resin of Jung et al to achieve superior etch resistance, thermal resistance, and adhesiveness, with reasonable expectation of achieving a material suitable for a resist flow process.

7. Claims 7 and 8 are rejected under 35 U.S.C. 103(a) as being obvious over Kim et al (6,627,384).

The applied reference has a common Inventor and Assignee with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art only under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 103(a) might be overcome by: (1) a

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showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not an invention "by another"; (2) a showing of a date of invention for the claimed subject matter of the application which corresponds to subject matter disclosed but not claimed in the reference, prior to the effective U.S. filing date of the reference under 37 CFR 1.131; or (3) an oath or declaration under 37 CFR 1.130 stating that the application and reference are currently owned by the same party and that the inventor named in the application is the prior inventor under 35 U.S.C. 104, together with a terminal disclaimer in accordance with 37 CFR 1.321(c). For applications filed on or after November 29, 1999, this rejection might also be overcome by showing that the subject matter of the reference and the claimed invention were, at the time the invention was made, owned by the same person or subject to an obligation of assignment to the same person. See MPEP § 706.02(l)(1) and § 706.02(l)(2).

Kim et al has been discussed above. The reference teaches that the resin may employ any known photoresist resin constituents.

Jung et al discloses a ArF photoresist copolymer which provides superior etch resistance, thermal resistance, and adhesiveness (column 2, lines 37-40). The preferred copolymer comprises a bicyclo alkene and a maleic anhydride compound (column 2, lines 63-67). A preferred copolymer comprises maleic anhydride and t-butyl 5-norborene-2-carboxylate or 2-hydroxyethyl 5-norborene-2-carboxylate, which meets the limitations of the instant claims 7 and 8.

Given the teachings of Jung et al, it would have been obvious to one of ordinary skill in the art to prepare the material of Kim et al choosing to employ the resin of Jung et al to achieve

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superior etch resistance, thermal resistance, and adhesiveness, with reasonable expectation of achieving a material suitable for a resist flow process.

Allowable Subject Matter

8. Claim 9 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

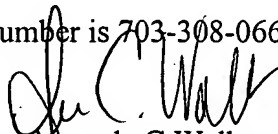
The prior art of record fails to teach or suggest to one of ordinary skill in the art to prepare the material of claim 1 wherein the resin is that claimed by the instant claim 9. This was confirmed by a structure search performed by a PTO employee.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Amanda C Walke whose telephone number is 703-305-0407.

The examiner can normally be reached on M-R 5:30-4.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Janet Baxter can be reached on 703-308-2303. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.


Amanda C Walke
Examiner
Art Unit 1752

ACW
November 2, 2003